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IMPROVING MULTICORE SYSTEM PERFORMANCE USING THREADING SYNCHRONIZATION

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ABSTRACT

In today's system, speed of CPU is not beneficial for fast processing. The way that they use to execute task not utilizes the CPU to its 100 percent level. We proposes a multicore hardware platform that will enhance the efficiency of a system and also provide more security. Hybrid AES-BRA algorithm is used. It could be used to measure performance impact from different p-states. Energy management can be performed at many levels of granularity and through various techniques. Comparing our approach to sequential shows gains in compute energy efficiency. In this way dynamic management scheme saves energy consumption.

KEYWORDS: Parallel processing, data security, BRA algorithm.

Introduction

As processors, have increase in performance and speed, processor power & energy consumption have become key challenges in the design of future high-performance systems. The maximum utilization of CPU in present system is 32-40%. Task is executed using sequential operation & that sequential execution cannot utilize CPU time efficiently. Thus, increases time complexity of executing task. In proposed system, we are changing the approach of task execution. To increase efficiency of system, we proposes software platform. We present a multicore architecture where all cores execute the same instruction set, but have different capabilities & also performance levels. At run time, system software evaluates the resource requirements of an application and further chooses the core that can best meet these requirements while minimizing energy consumption. The motivation behind this is to reduce power consumption, and release s reserved resources for other applications.

The dynamic power management approach balances utilized processor resources against current work- load at runtime. The power management observes the processor statistics ie utilization, and evaluates the amount of required resources, i.e. the number of active processors. We have implemented software platform and evaluated various operation on a range of platforms, from embedded processors typical for mobile phones up to high-end server platforms. Important reasons about the extremely high energy consumption in cloud data centers can attributed to the low utilization of computing resources that incurs a higher volume of energy consumption as compared with efficient utilization of resources. The resources with a low utilization consume an unacceptable amount of energy & time.

According to recent studies, the average resource utilization in various data centers is lower than 30% and the energy consumption of idle resources is more than 70%. We are providing security mechanism to information in serial & parallel way for existing & proposed system. We will consider power and computational factor of processor. Three levels of security are provided Authentication level security, Data level security, Network level security. BRA & AES top 2 security algorithms by combining will give higher level security. This algorithm is providing more security, because it is harder to crack the message. Result shows that, if this project is run in serial way, then utilization of CPU is 30-40%.If same project is run by proposed approach, CPU utilization will be upto 100%.

Materials and Methods:

Recent survey of green data centers and energy-efficient cloud computing systems found in [1], [2]. Overview of energy and time efficiency techniques in cluster computing systems was provided in [3]. In [4], the authors proposed a method to route a request to the data center that is nearest in terms of geographical distance, results in least electricity, and emits the smallest amount of carbon. In [5] the authors studied the problem of scheduling batch jobs for multiple geographically distributed data centers, and proposed a provably efficient online scheduling algorithm, which optimizes the energy cost and fairness among different organizations, subject to queueing delay constraints, which satisfy the maximum server inlet temperature constraints. In [13] the authors stated the problem regarding scheduling batch jobs for multiple geographically. Distributed data centers, and proposed a provably efficient online scheduling algorithm, which efficiently optimizes the cost of energy and justice among the different organizations, subject to queueing delay interruption, while satisfying the maximum server inlet temperature constraints. Workload dependent dynamic power management has been studied by a number of researchers. For each group of applications, we should choose the lowest core speed so that the group of applications can be completed within certain specified performance constraints [14]. Another one workload related power management technique is workload placement. The method includes the maximization of both spatial and temporal idleness through workload placement. In the space measure, applications which are used are placed on a few running cores which run at high speed, while remaining cores are in an idle and low power consuming state. In the time measure, applications used are scheduled to run together at high speed, so the cores can be in an idle and minimum power consuming state in other times. This type of workload dependent dynamic power management includes attention of the common core utilization and workload statistics, reconsidering the number of required cores to reach the goal of projected performance, re-mapping the workload to the reduced set of active cores, and setting other dative cores to a power-saving state [15]. It has been seen that such idle-maximization can minimizes average power consumption [16].

Author Gaurav Patel has projected Hybrid Encryption Algorithm. It is a blend of strength of two algorithms. First is RSA algorithm and another is diffie hellman algorithm. Bitwise X or operation is used for enhancement of the security and also enhance the complexity of the hackers. One issue is in system that it increases complexity of data. [17] The asymmetric RSA algorithm has projected by Ashraful Islam .The text message is encoded by using shared secret key. The secret key should be shared among connections earlier than message transmission. The sending of text message through dissimilar SNR level. Those transmit the message to receiver end. At receiver end decoding is done by using secret key. Benefit of this algorithm is not difficulty in retrieving the data at receiver side. [18]

Discussion:

High Performance Computing (HPC)

"Multicore System of HPC framework" technique increase the performance of data security algorithm which uses sequential processing they are modified using the theory of parallel processing. Still there is a chance of performance improvement of hybrid AES-BRA algorithm by using Parallel Processing. HPC systems popularly known as Supercomputers, generally capitalize on aggregating computing power in a way that delivers much higher performance than one could get out of a typical single desktop computer or workstation in order to solve large problems in engineering, or business. They are used for a wide range of computationally in-depth tasks in various fields such as, comprise quantum mechanics, weather forecasting, climate research, oil and gas exploration, molecular modeling and or physical simulations. HPC systems have been shifting from expensive massively parallel architectures to clusters of commodity computers in order to take advantage of cost and performance benefits.

Multithreading

Initially program start with master thread. We can make some part of the program so as to work in parallel by constructing child threads. Master thread executes in serially until the parallel region construct is encountered. Parent thread construct a group of parallel child threads (fork) which simultaneously execute statements in the parallel region. The work sharing construct split the work between all the threads. After executing the statements in the parallel region, group threads synchronize and enumerate but master continues.

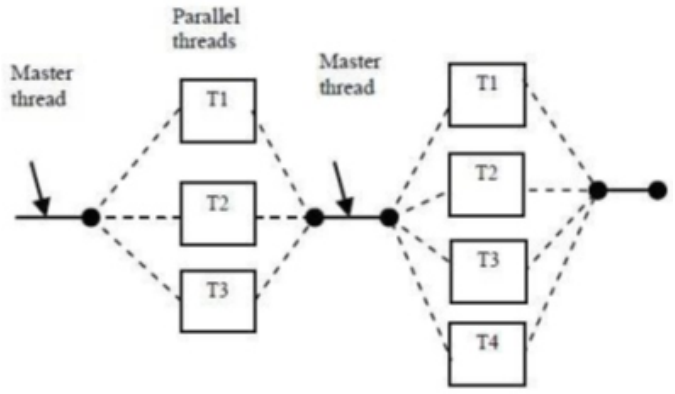

Fig 1. Fork-Join Parallelism

Single Core and Multi Core

Single Core:

A single core processor is a microprocessor with a single core on a chip, running a single thread at certain time. The term became common after the emergence of multicore processors to distinguish non multi core designs. Most microprocessors prior to the multi core era are single core. The class of many core, in a processor follows on from multicore in a progression showing increasing parallelism over time. Processors remained single core unit it was impossible to achieve performance gains from the increased clock speed and transistor count allowed by Moore's law.

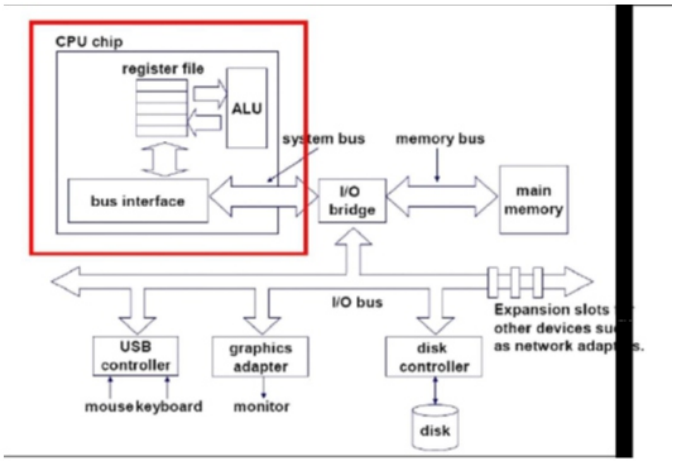

Fig 2. Single core architecture

Multi Core:

Multi core assign two or multiple processors. But they are different from independent parallel processors as they are integrated on the similar chip circuit. A multi core processor implement message passing or shared memory inter core communication methods in multiprocessing. If the number of threads are less than or equal to the number of cores, separate core is provided to each thread and threads run independently on these multiple cores. If the number of threads are more than the number of cores, the cores are distributed among the threads. Any application that can be threaded can be mapped effortlessly to multi-core, but the improvement in performance gained by the usage of multi core processors depends on the portion of the program that can be parallelized.

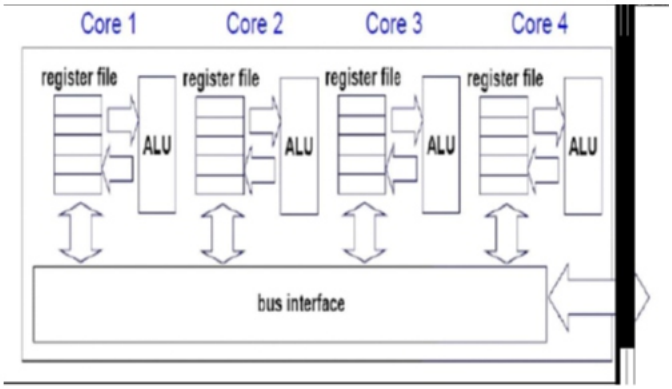

Fig 3.Multicore Architecture

A. SYSTEM FRAMEWORK

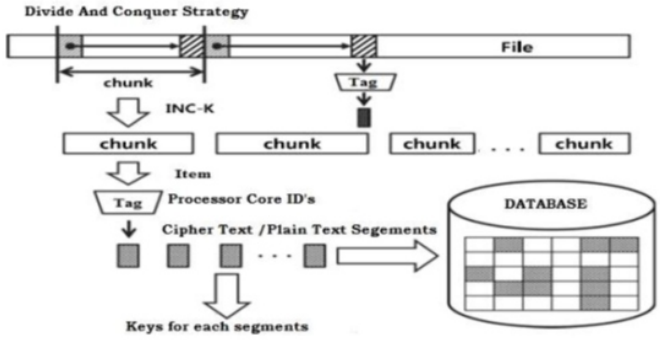

Fig 4.System Architecture

B. CHUNKING

Chunking in psychology is a process by which individual pieces of information are bound together into a meaningful whole. A chunk is defined as a familiar collection of more elementary units that have been inter associated and stored in memory repeatedly and acting as a coherent & integrated group when retrieved.

Conclusions:

Energy consumption can be reduced for multicore processors using hardware platform of parallel operation. Using hybrid BRA-AES algorithm are taking 13% less time for text, image, pdf, application, etc for their encryption and decryption as compare to AES algorithm. Performance analysis of hybrid BRA-AES Algorithm for file encryption and decryption process is done.

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